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TITLE: STORAGE BATTERY STATE DETECTOR

Abstract Text - FPAR (1):

PURPOSE: To detect the sign of the dry up of a sealed lead storage battery so as to prevent the breakage of a battery circuit by inserting the electrode at the lower part of the metallic rod covered for insulation to the bottom of a battery jar, and connecting the terminal at the top to a detection circuit.

Abstract Text - FPAR (2):

CONSTITUTION: A metallic rod is covered with insulating material, and a tip exposed section is provided with an electrode 2, and the other end is provided with a terminal 4. The insulating cover of this electrode body is covered with a tubular object, and a slit is provided in the position which covers the electrode at the tip. This electrode body is inserted to the bottom of a group of electrode plates 11 within the battery jar 12 of a sealed lead battery. Next, a detection circuit 10 equipped with a light emitting diode 10A and a current reducing resistor 10B is provided between the above terminal 4 and the terminal 9 lower in potential than the cell inserted in the electrode body. This detection circuit 10 detects that the electrolyte which shows the level L1-L3 at the initial stage of use decreases to the level of about L4, and that it falls to the specified voltage or under or reaches zero potential.

[Claim(s)]

[Claim 1]An electrode and the other end are constituted for a tip exposed part of a metal stick by which pre-insulation was carried out as a terminal area, A tube-like object connected with pre-insulation from a pre-insulation tip perimeter end is made to hang to a position which covers an electrode, Are the electrode body which provided a slit in said tube-like object flank, and said electrode body is inserted to a polar-plate group lower end part of a direct vent type lead storage battery, A storage battery state detection device characterized by providing a detector circuit between a terminal whose potential is lower than an electrode body insertion cell, and an electrode body terminal area, carrying out an alarm as a case where potential of an electrode body terminal area turns into a fall or non-potential from predetermined potential being unusual, and making it display as normal when higher than predetermined potential.

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to improvement of a method which detects the abnormalities of the battery in the use which uses them carrying out series connection of many direct vent type lead storage batteries (it is henceforth called a battery), such as an electromobile, at an early stage.

[0002]

[Description of the Prior Art]In the use which connects many batteries in series like an electromobile, and is used as grouped cells, if it is generated by a battery with little capacity, or the broken battery also in one cell in grouped cells, this battery may become a factor and may also intercept electric discharge or charge of grouped cells.

[0003]The device which supervises transition of the internal resistance of a battery is equipped, and if the voltage of beyond default value, at i.e., the time of electric discharge or charge, exceeds the range of default value, internal resistance takes out an alarm with an electromobile and he is trying to prevent battery failure beforehand with it, in order to prevent such an accident beforehand.

[0004]However, when the internal resistance of a battery begins to rise, it has the character to go up rapidly, and when a sensing device detects abnormalities, capacity recovery of a battery is difficult, and with the electromobile, the failures where a run on the street becomes impossible almos! simultaneously with an alarm check are occurring frequently.

[0005]

[Means for solving problem]This invention perceived the isolation electrolysis solution in a direct vent type lead storage battery in order to solve the above-mentioned conventional problem. While the separator in a battery is an isolation board, it also has a function as an

electrolysis solution retainer board. Although the electrolysis solution separated in the state of neglect and electric discharge hardly exists, by the gas emitted between active materials at the time of charge, the electrolysis solution contained between active materials is breathed out very much out of a plates element, and the interval part of an element and ***** is gone up. [0006]The rise of this electrolysis solution is adjusting the amount of pouring in so that the electrolysis solution separated even if it was [fault] under charge may not become more than an element top end, in order to prevent ****.

[0007]However, since it becomes the same character as a liquid type battery between polar plates when this separated electrolysis solution exists so much, it is intercepted that the generating gas at the time of charge approaches a cathode plate by a solution layer, the gas absorption in a cathode plate becomes impossible, and generating gas is exhausted outside in the state of gas. As a result, isolation electrolysis solutions decrease in number with many years past, and the isolation liquid which appears in said interval part decreases in number gradually. Since gas absorption efficiency rises along with this, it becomes impossible to check isolation liquid except the time of fault charge.

[0008]If the electrolysis solution separated from between polar plates stops flowing out even if it is under charge, [this invention] It found out that it was a sign it becomes impossible to be equal to fault charge if the internal resistance of a battery also going up and calorific capacity's also becoming small and this time pass. If this state is detected and equalizing charge is carried out, capacity recovery is also possible, and if this time is detected, it is based on having found out that the accident in which a discharge circuit is immediately intercepted by the dry rise by rapid fault charge did not occur, either.

[0009]Namely, this invention storage battery state detection device carries out pre-insulation of except for a metal stick tip and the other end. The tube-like object which constitutes an electrode and the other end as a terminal area, and is connected with pre-insulation from a pre-insulation tip perimeter end in a tip part is made to hang to the position which covers an electrode. This electrode body is inserted in this tube-like object flank using the electrode body which provided the slit to the polar-plate group lower end part of a direct vent type lead storage battery. The detector circuit was provided between the terminal whose potential is lower than an electrode body insertion cell, and the electrode body terminal area, and the alarm was carried out as the case where the potential of an electrode body terminal area turns into a fall or non-potential from predetermined potential being unusual, and when higher than predetermined potential, it was made to display as normal.

[0010]

[Function]The sign of a dry rise of a direct vent type lead storage battery can be detected, and interception of the battery circuit by the dry rises rapidly generated during a run, such as an electromobile, can be beforehand prevented now.

[0011]

[Working example] Hereafter, this invention is explained based on an embodiment. Drawing 1 is a figure showing the electrode body used for this invention storage battery state detection device, and detects the existence of the isolation electrolysis solution in a battery. It is the figure where (b) provided the front view of the electrode body, (**) provided the sectional view, and (**) formed the lid in the electrode body lower part in the figure. In drawing 1, 1 is a metal stick, since regular negative potential is impressed, even if it is the metal of the arbitrary quality of the material, it is not corroded, but since there is possibility of corrosion when electrode body potential turns into non-potential before use, as the quality of the material of a metal stick, a lead or copper is suitable. When using copper, when **** is used, in order for an electrolysis solution to go up the crevice by capillarity and to make a terminal area corrode, a thing without crevices, such as a single fiber line, is used.

[0012] 2 is a tip exposed part of the metal stick 1, and makes this an electrode. 3 is a path cord linked to an other end exposed metal portion of the electrode 2 of the metal stick 1, and the tip is connected to a terminal area. When single fiber copper wire is used for the metal stick 1, if a lower end of single fiber copper wire is used as an electrode and the other end is made into a terminal area, the path cord 3 can be omitted, a welding part of the path cord 3 and the metal stick 1 is lost, disconnection by corrosion is lost, and it becomes a reliable electrode body.

[0013] 5 is insulating coating made of resin which carries out pre-insulation of the portion except the electrode 2 and a terminal area of the metal stick 1, and the tube-like object 6 which was united with insulating coating from a lower end peripheral part of the insulating coating 5 is made to hang, and it is made for the lower end to be located from a lower end of the electrode 2 in a downward position.

[0014] 7 is the slit provided in a lower end flank of the tube-like object 6, and enables it to contact the electrode 2 and an electrolysis solution in the tube-like object 6 through the slit 7. 8 is a sealing plug for electrode body fixation.

[0015] Drawing 2 shows an example of this invention storage battery state detection device which inserted an electrode body in the 5th cell from a cathode terminal of a 6 cell-configuration mono-block battery.

[0016] Although it comprises the light emitting diode 10A and the decrease flow resistance 10B, in the figure, 10 is the detector circuit provided between the electrode body terminal area 4 and the cathode terminal 9, and what is necessary is just a detector circuit which can display the existence of potential by contact with the isolation electrolysis solution of the electrode 2 circumference. In the figure, although the insertion cell of the electrode body has become the 5th from the cathode terminal 9, even if it inserts it in the 6th arbitrary cell from the 2nd, the same circuit composition of it is attained. As for **** and 13, in drawing 2, 11 is [a valve portion and 15] connection levers a battery lid and 14 plates and 12 very much.

[0017]The electrolysis solution separated at the time of charge as the direct vent type lead storage battery was mentioned above goes up a gap with the plates 11 very much with the inner wall surface of **** 12. Although the ascending position of an electrolysis solution is different by composition of a battery, usually it goes up to the level of L1 shown in the figure by initial use - L3. In the battery by which an isolation electrolysis solution goes up to L1 - L2, in order to intercept a sealing reaction with the electrolysis solution between polar plates at the time of charge, some electrolysis solutions serve as gas, it is exhausted, and the amount of electrolysis solutions decreases gradually. The electrolysis solution which sealing reaction efficiency also became near 100% when the rise of an isolation electrolysis solution decreased to near the level of L3, the electrolysis solutions separated even if it was a battery of the end of life hardly decreased in number, and was separated for every charge appears.

[0018]However, by the battery group which connected the battery in series, even if the charger is operating normally with the capacity variation between batteries, excess voltage will be impressed to a battery with little capacity, and the suspension current of the maximum capacity of a charger will receive fault charge. In this case, generating gas volume exceeds the gas absorption capability of the negative pole far, and, as a result, disassembles and exhausts an electrolysis solution outside for a short period of time. Although the charging current in this case is usually about 0.1C-0.2C, Like an electromobile, in the time of a run and acceleration, the discharge current of 2-5C flows, and if a battery with little [as mentioned above] capacity exists, it will be exhausted out of a battery in the state of steam instead of hydrogen and the oxygen gas receive reverse charge, and the electrolysis solution between polar plates boils by generation of heat, and emitted in electrolysis.

[0019]The quantity of heat (the amount of electricity) by which exhaust air consumption is carried out in the state of steam has about 20 times as many differences by the water 1g per 0.539k calorie and 11k calorie by the quantity of heat by which exhaust air consumption is decomposed and carried out by electrolysis. As a result, it is L4 of drawing 2. If it does not exist while the isolation electrolysis solution of a grade charges, and it will be in a reverse charging state at the time of acceleration, in order to boil a battery in several minutes and to exhaust a part for a battery inland sea in the state of steam, with moisture between polar plates, it is checked that it will be in the state of a dry rise easily.

[0020]the electrolysis solution separated as such a state was shown in drawing 2 for preventing beforehand -- L -- it will become too late if an alarm is not taken out at the time to exist [4-about].

[0021]Since the electrode 2 contacts the plates 11 very much and causes malfunction, the tubed voice 6 is made to hang from the lower end peripheral part of the pre-insulation 5, when the electrode body of drawing 2 is inserted very much in the gap part of the plates 11 and the wall surface in **** 12. An isolation electrolysis solution serves as a lower part from the

electrode 2, when a leak circuit is constituted for the plates 11 and the electrode 2 through the inner wall surface of the tube-like object 6, it will be decomposed by leakage current, moisture of the inner wall surface of the tube-like object 6 will be in a dry state in 1 to 2 minutes, and the plates 11 serve as the electrode 2 with letter-breaking-off-the-relation voice completely very much. Therefore, unless an isolation electrolysis solution contacts the electrode 2 directly, detection current does not flow. When the slit 7 of tube-like object 6 flank has an isolation electrolysis solution up from the electrode 2, If the incision part top end of the slit 7 does not have an interval of several millimeters from the lower end of the pre-insulation 5 as an electrolysis solution can be contacted through the slit 7, the drop of an electrolysis solution may adhere to the inner wall surface top end of the tube-like object 6, and this will cause malfunction.

[0022]When the lid 7A of the electrode body lower end part of (**) of drawing 1 inserts an electrode body into a battery, it has prevented them from the textiles of a separator invading in the tube-like object 6, and causing malfunction.

[0023]

[Effect of the Invention]The battery became a dry rise, it intercepted the battery circuit and, in the case of the electromobile, it became impossible running it at the same time it could not detect the state of dry rise this side but the measuring instrument took out the alarm with the detecting method which measured the conventional internal resistance. However, according to this invention storage battery state detection device, the signs of a dry rise can be detected about one month ago, and a battery life can be sharply developed now by disposal of equalizing charge etc. A detector circuit becomes it is easy and easy [a remote display]

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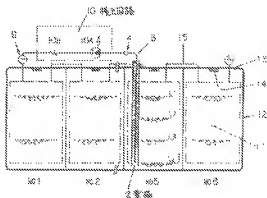
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(54) 【発明の名称】 蓄電池状態検出装置

(57) 【要約】

【目的】 同路を標準で、遠隔表示しでき、事前にエラーアラームの発報を検出できる蓄電池状態検出装置を提供する。

【構成】 絶縁被覆された金属棒の一端露出部と電極他端部を導く導として構成し、絶縁被覆先端部内周より絶縁被覆と連なる筒状体を電極を覆う位置まで挿入させ、この筒状体内部にクリップを設けた電極棒を用い、この電極棒を前開式鉛蓄電池の極板群と導部まで挿入し、電極棒挿入部より電位が低い端子と電極棒挿入部との間に検出回路を設け、電極棒挿入部の電位が所定の電位より低下しない場合は電位とった場合正常として警報し、所定の電位より低い場合は異常として表示するようにした蓄電池状態検出装置。



を低下させ、その1極は電極との下部より下方の領域におけるようにする。

【0114】一方、図14の上部に設けられたスリットや、スリットを通し筒状体内部の電解液と電解液が接触できるようにしている。これは電極体固定用密封材である。

【0115】図15はセル構成をフロー式電池の充放電端子より外部セルに電極体と挿入した本発明用電池状態を抽出装置の一例を示すものである。

【0116】図面において11は電極体抽出部と負極端子との間に設けた抽出回路であり、充電ダイオード11aと共流抵抗11bとで構成されているが、電極と負極との電解液解離時の接触により電圧の差が表れてくる抽出回路であればよい。また、同定では電極体の挿入セルは負極側よりより第1電極となっており第2電極より第1電極の位置のセルに挿入しても同様の回路構成が可能となる。【図2において11は検取部、11aは電極、11bは電極体、11cは負部、11dは検取部である。

【0117】充放電回路電流は前記したように充電時は、充電された電極液が電極12の表面と接触し11という回路を上昇する。電池の構成により電解液の導電率は相違するが、使用初期では図15に示す11より11bのへりより上昇するものが普通である。11より11bまで電解液が上昇する電池では、充電時極部側の電解液で充電反応を進行させるため、電解液の一部はガスとなって発生し、電解液は徐々に減少する。最終電極液の11より11bのレベル近くまで減少すると使用時に其電解液は11bの位置で残り、外部未充の電池であっても充電した電解液はほとんど残存することはなく充電時に電極12の電解液が見える。

【0118】しかし、電池を直列に接続した電池群では電解液の容量がバラバラでたとえ充電率が正確に判定していても、容量の少ない電池に過電圧が印加され、充電の最大容量の半の電流で過充電を受ける。この場合、発生ガス量が増加しガスの吸収能力がなくなるに基き、この結果短時間で電解液を分解、外部に排出する。この場合や充電電流は通常より10、20、30倍程度であるが、電気が自動取り上げに実行、制御などでは、ガスの放電電流が流れ、前記のように容量の少ない電池が存在すると過充電を発生発熱により極負極の電解液が薄汚し電気分解が発生する不潔、静電ガスのため、水素ガスの発生で電池外に排出される。

【0119】水素ガスの発生で排気用される熱量（電解液）は電気分解で分解され排気用とされる熱量とでは大きく、30℃から40℃と11℃から10℃で約10倍の差がある。この結果図15の11極側の電解液が充電中に存在しないと、充電時、電圧は検取部に流れ排出回路の途中で11極側で電池は過熱し、電池内部のセル平衡の状態で正常するため、容易に11より11bの位置に陥ることと確認されている。

【0120】このような状態が常態に防止するため、図15に示すように充電した電解液は11bの位置から上昇し時間経過を待たないで排出される。

【0121】図16の電解液は極部11と電極12の界面とで接触部に挿入した場合、電極12が移動し11と接触し、11と12の間に生じた電解液は電極12の下部に溜まり部状態の状態で待っている。また、電解液が電極12の下部より下向きになり、極部11と電極12の間が11bの位置を通り、11bの位置が確保された場合、電極12の内部表面の未反応の電解液により分解され、11bと電極12は電極体となり、電極12と極部11とは電解液中に電極状態になる。よって電解液が電極12と極部11の間に溜まり電解液は減ることはない。極部12と極部11の間に電解液が電極12より下向きになる場合、スリットを通し電解液と接触するより11bにたまり、また、スリットは充電時11bが過電圧状態の下部より第1電極との距離がない電解液が面を無断の11極面と極部11に蓄積する可能性がある。これにより過電圧の発生となる。

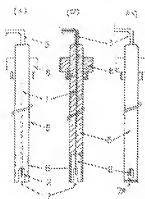
【0122】図17の（a）、（b）の電極体下部の開口部は、電極液を電池内に挿入する際、セル12の電極と極部11の間に挿入し過電圧の発生を防止している。

【0123】【電圧の検取】従来の内部抵抗を測定した検出ではトランスファの検出は検出でなく、測定器が検出を出した時に同時に電極はトランスファになり電圧回路を通過し、電圧自動車の検出で下降となった。しかし、本発明は電圧検出装置により、約1分間に11より11bの電流を抽出でき、約1分間電圧の検出により電圧の面を大幅に伸ばすことができるようになる。また、極部11の電圧は検取部、検取部からの検出となる。

【12】本発明用電池は電極体と電極液とを抽出する。【図1】本発明用電池は電極体と電極液とを抽出する。【図2】本発明用電池は電極体と電極液とを抽出する。【図3】本発明用電池は電極体と電極液とを抽出する。

- 1 金網
- 2 電極
- 3 リード線
- 4 端子
- 5 絶縁板
- 6 筒状体
- 7 スリット
- 8 電極体固定用密封材
- 9 負極端子
- 10 検出回路
- 11a 充電ダイオード
- 11b 共流抵抗
- 11c 負極端子
- 11d 電極

【圖1】



【圖2】

